The Claims

What is claimed is:

1. A food composition intended to prevent or restore age-related functional deficits in mammals, which comprises an edible substance and a combination that is able to mimic the effects of caloric restriction on gene expression, the combination containing (a) at least one molecule that stimulates energy metabolism of the cell in an amount effective to cause such stimulation, and (b) at least one antioxidant in an amount effective to reduce or prevent oxidative damage resulting from disruption of ATP/ADP or NAD+/NADH homeostasis due to increased substrate availability or utilization in aged mitochondria.

2. The food composition according to claim 1, wherein the molecule stimulates energy metabolism of mitochondria.

3. The food composition according to claim 1, wherein the molecule is L-carnitine, creatine, a monounsaturated or polyunsaturated fatty acid, cardiolipin, nicotinamide, or a carbohydrate or natural source containing such a molecule.

4. The food composition according to claim 1, wherein the amount of the molecule is of at least 1mg to 1 g per kg of body weight per day.

5. The food composition according to claim 1, wherein the antioxidant is a source of a thiol or a compound that upregulates their biosynthesis in vivo.

6. The food composition according to claim 5, wherein the antioxidant is lipoic acid, cysteine, cystine, methionine, S-adenosyl-methionine, taurine, glutathione or a natural source thereof.

7. The food composition according to claim 1, wherein the amount of the antioxidant is of at least 0.025 mg to 250mg per kg of body weight per day.

8. The food composition according to claim 1, in which the antioxidant is used in combination with a further antioxidant.

9. The food composition according to claim 8, in which the further antioxidant is vitamin C, vitamin E, carotenoids, ubiquinones, tea catechins, coffee extracts containing polyphenols and/or diterpenes, ginkgo biloba extracts, grape or grape seed extracts rich in proanthocyanidins, spice extracts, soy extracts containing isoflavones, a related phytoestrogen or other source of flavonoids having antioxidant activity, or a compound that upregulates a cell antioxidant defense.

10. The food composition according to claim 8, in which the further antioxidant is ursodeoxycholic acid, ursolic acid, ginseng, a gingenoside, or a natural source thereof.

11. The food composition according to claim 1, which further comprises an effective amount of a prebiotic micro-organism, a probiotic micro-organism, or both.

12. A pet food or dietary supplement comprising the food composition according to claim 1.

13. A nutritionally complete human food composition or a dietary supplement comprising the food composition according to claim 1.

14. A method for preventing or delaying mitochondria dysfunction occurring in a mammal during aging, which method comprises administering to a mammal in need of such treatment a combination that is able to mimic the effects of caloric restriction on gene expression, the combination containing (a) at least one molecule that stimulates energy metabolism of the cell in an amount effective to cause such stimulation, and (b) at least one antioxidant in an amount effective to reduce or prevent oxidative damage resulting from disruption of ATP/ADP or NAD+/NADH homeostasis due to increased substrate availability or utilization in aged mitochondria, and being administered in an amount effective to modulate or regulate expression of genes linked to energy metaboism.

15. The method of claim 14, wherein the combination is administered to the mammal by way of a food composition that is consumed by the mammal.

16. The method of claim 15, wherein the food composition contains further additives to improve one or more of skeletal and cardiac muscle function, vascular function, cognitive function, vision, hearing, olfaction, skin and coat quality, bone and joint health, renal health, gut function, immune function, insulin sensitivity, or inflammatory processes.

17. A method for preventing or restoring age-related functional deficits in mammals which comprises administering to a mammal in need of such treatment a combination that is able to mimic the effects of caloric restriction on gene expression, the combination containing (a) at least one molecule that stimulates energy metabolism of the cell in an amount effective to cause such stimulation, and (b) at least one antioxidant in an amount effective to reduce or prevent oxidative damage resulting from disruption of ATP/ADP or NAD+/NADH homeostasis due to increased substrate availability or utilization in aged mitochondria.

18. The method of claim 17, wherein the molecule stimulates energy metabolism of mitochondria.

19. The method of claim 17, wherein the combination is administered in an amount effective to modulate or regulate expression of genes linked to energy metabolism.

20. The method of claim 17, wherein the molecule that stimulates energy metabolism of the cell is L-carnitine, creatine, fatty acids (mono and polyunsaturated, particularly omega-3 fatty acids), cardiolipin, nicotinamide or a carbohydrate or natural source containing such a molecule.

21. The method of claim 17, wherein the antioxidant is a source of thiols (e.g. Lipoic acid, cysteine, cystine, methionine, S-adenosyl-methionine, taurine, glutathione and natural sources thereof), or a compound that upregulates their biosynthesis in vivo.

22. The method of claim 17, in which the antioxidant is used in association with a further antioxidant.

23. The method of claim 22 wherein the further antioxidant is vitamin C, vitamin E, carotenoids, ubiquinones, tea catechins, coffee extracts containing polyphenols and/or diterpenes, ginkgo biloba extracts, grape or grape seed extracts rich in proanthocyanidins, spice extracts, soy extracts containing isoflavones and related phytoestrogens and other sources of flavonoids with antioxidant activity or compounds that upregulate cell antioxidant defense.

24. The method of claim 17, wherein the amount of the molecule is at least 1mg to 1 g per kg of body weight of the mammal per day and the amount of the antioxidant is at least 0.025 mg to 250mg per kg of body weight of the mammal per day.

25. A method to prevent or restore age-related functional deficits in mammals, comprising administering to the mammal the food composition according to claim 1.